EXHIBIT D

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

CARNEGIE INSTITUTION OF WASHINGTON, M7D CORPORATION, *Plaintiffs*, v. PURE GROWN DIAMONDS, INC., IIA TECHNOLOGIES PTE. LTD D/B/A IIA TECHNOLOGIES, *Defendants*.	Civil Action No. 1:20-cv-00189-JSR

PLAINTIFFS' LOCAL PATENT RULE 6 DISCLOSURE TO DEFENDANTS
PURE GROWN DIAMONDS, INC. AND IIA TECHNOLOGIES PTE. LTD.

Pursuant to Local Patent Rule 6 of the Southern District of New York, Plaintiffs Carnegie Institution of Washington and M7D Corporation (collectively, "Plaintiffs") hereby identify for Defendants Pure Grown Diamonds, Inc. and IIA Technologies Pte. Ltd. ("Defendants") each claim of U.S. Patent Nos. 6,858,078 and RE41,189 (collectively, the "Asserted Patents") that Plaintiffs contend is infringed by Defendants, and each of Defendants' infringing products or processes of which Plaintiffs are aware. As set forth in the attached exhibits and below, each of Defendants individually and/or collectively infringe the identified claims through the manufacture, sale, offer for sale, importation, and/or distribution of gem-quality lab-grown diamonds in the U.S.

This Disclosure is without any concession, agreement, admission, or waiver of any ultimate determination of relevance, admissibility, or discoverability of particular information for any purpose, and without waiver of any attorney-client, work product, or other privilege or immunity.

To the extent the Court construes any claim or claim language of the Asserted Patents, additional arguments and/or information may be relevant in light of any such construction. Plaintiffs therefore reserve the right to supplement and/or amend this Disclosure at any time in view of the Court's construction, in view of any new information learned during discovery, and/or for any other reason permissible under the applicable Federal and Local Rules.

Plaintiffs make this Disclosure based on presently-available information, without the benefit of discovery, and without the benefit of direct access and inspection of Defendants' manufacturing processes and those of its suppliers and/or vendors. This Disclosure is based at least in part on publicly available information. Discovery in this case has just begun, and Plaintiffs' investigation of Defendants' infringement is ongoing. Accordingly, Plaintiffs may identify additional asserted claims and/or accused products as discovery progresses. Plaintiffs expressly reserve the right to amend this Disclosure to include additional asserted claims and/or products. This Disclosure is made based on information ascertained to date. Plaintiffs expressly reserve the right to modify or amend this Disclosure based on any position taken by Defendants in this action or any position implied by Defendants in their forthcoming invalidity contentions. Plaintiffs further reserve the right to modify or amend this Disclosure to reflect additional information that becomes available to Plaintiffs as discovery proceeds.

As for products imported, sold, offered for sale, or used in the United States, by or on behalf of Defendants, which are made from a process covered by the Asserted Patents, Plaintiffs contend that a substantial likelihood exists that such products were made by the patented process. Plaintiffs have made and are continuing to make a reasonable effort to determine the precise process used to produce the infringing product. Plaintiffs accordingly reserve all rights under 35 U.S.C. §§ 271 and 295 in making this disclosure.

Based on present information, Plaintiffs contend under 35 U.S.C. §§ 271(a) and 271(g) that Defendants directly infringe each of claims 1, 6, 7, 11, 12, 15, 16, and 20 of U.S. Patent No. 6,858,078, and claims 1 and 2 of U.S. Patent No. RE41,189, either literally or under the doctrine of equivalents, by making, using, selling, offering for sale, and/or importing the below products, by performing the below processes, and/or by having the below processes performed.

Plaintiffs further contend under 35 U.S.C. §§ 271(b) and 271(c) that Defendants indirectly infringe each above claim of the Asserted Patents by inducing and/or contributing to direct infringement by *inter alia* Defendants' known and unknown suppliers (including but not limited to each of Defendants Pure Grown Diamonds, LLC and IIa Technologies PTE Ltd.), and/or Defendants' vendors, downstream distributors, retailers, and/or end users.

Plaintiffs further contend that Defendants have willfully infringed, and continue to willfully infringe, each above claim of the Asserted Patents, with knowledge of the Asserted Patents and knowledge that their CVD diamonds and/or annealed diamonds infringe at least one claim thereof (or with willful blindness thereto).

Products: All diamonds manufactured through a chemical vapor deposition process ("CVD Diamonds"), including annealed diamonds ("Annealed Diamonds"), and all products incorporating CVD Diamonds or Annealed Diamonds, including but not limited to CVD Diamonds or Annealed Diamonds of any source or products incorporating the same, including CVD Diamonds or Annealed Diamonds provided by both or either of IIa Technologies PTE Ltd. or Pure Grown Diamonds, LLC and products incorporating the same.[1] To the extent any

[1] See, e.g., Complaint ¶¶81–91; Press release, "World's Largest Pure Grown Diamond Unveiled," PR Newswire (Dec. 8, 2014), https://tiny.cc/0qs7gz; https://puregrowndiamonds.com/#; https://puregrowndiamonds.com/; https://puregrowndiamonds.com/about/; http://2atechnologies.com/technology-overview/;

unlisted products infringe in substantially the same way as any listed products, the unlisted products should also be considered accused in this case.

Processes: Manufacture of CVD Diamonds (including, but not limited to the creation, growth, clarification, processing, and post-processing treatment of CVD Diamonds, further including but not limited to CVD deposition, annealing, processing of CVD Diamonds that alters their optical property/properties, testing of CVD Diamonds, and testing of Annealed Diamonds); Advertising, marketing, and promotion of CVD Diamonds or Annealed Diamonds or any products incorporating CVD Diamonds or Annealed Diamonds; Distribution of CVD Diamonds or Annealed Diamonds or any products incorporating CVD Diamonds or Annealed Diamonds; Importation into the United States of CVD Diamonds or Annealed Diamonds or any products incorporating CVD Diamonds or Annealed Diamonds; Offering to sell CVD Diamonds or Annealed Diamonds or any products incorporating CVD Diamonds or Annealed Diamonds within the United States; Selling CVD Diamonds or Annealed Diamonds or any products incorporating CVD Diamonds or Annealed Diamonds within the United States; and Using CVD Diamonds or Annealed Diamonds or any products incorporating CVD Diamonds or Annealed Diamonds within the United States. To the extent any unlisted processes infringe in substantially the same way as any listed processes, the unlisted processes should also be considered accused in this case.

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http://2atechnologies.com/technology-value-chain/; http://2atechnologies.com/history/; http://2atechnologies.com/industrial-diamond-applications/.

March 11, 2020

PERKINS COIE LLP

By:______________________________

Matthew J. Moffa
PERKINS COIE LLP
1155 Avenue of the Americas
22nd Floor
New York, NY 10036-2711
Telephone: (212) 261-6857
Fax: (212) 399-8057
e-mail: MMoffa@PerkinsCoie.com

Terrence J. Wikberg *(admitted pro hac vice)*
PERKINS COIE LLP
607 14th Street, NW
Washington, DC 20005
Telephone (202) 434-1649
Fax: (202) 654-9149
e-mail: Twikberg@PerkinsCoie.com

Counsel for Plaintiffs
Carnegie Institution of Washington and M7D Corporation

EXHIBIT A

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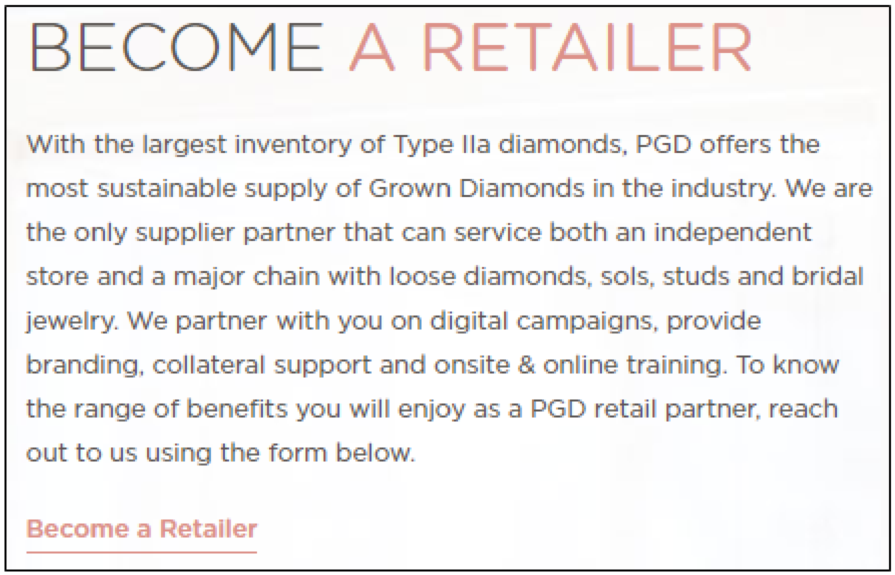
INFRINGEMENT CONTENTION CLAIM CHART
U.S. Pat. No. 6,858,078 to Hemley et al. ("'078") - Apparatus And Method For Diamond Production

'078 Claims	Pure Grown Diamonds / IIa Technologies Process
1[pre] A method for diamond production, comprising:	Each of Pure Grown Diamonds and IIa Technologies ("Defendants") individually or collectively produces lab grown diamonds. See generally:  BECOME A RETAILER With the largest inventory of Type IIa diamonds, PGD offers the most sustainable supply of Grown Diamonds in the industry. We are the only supplier partner that can service both an independent store and a major chain with loose diamonds, sols, studs and bridal jewelry. We partner with you on digital campaigns, provide branding, collateral support and onsite & online training. To know the range of benefits you will enjoy as a PGD retail partner, reach out to us using the form below. Become a Retailer Source: https://puregrowndiamonds.com/become-a-retailer/ (last visited March 9, 2020).

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	 Pure Grown Diamonds' (Gemesis Corporation) Chemical Vapor Deposition (CVD) Facilities in the USA Source: Half Acre Construction Source: https://www.jewellermagazine.com/Article/8228/Truth-behind-lab-created-diamonds-starts-to-be-exposed (last visited March 9, 2020). Misra is a world-renowned physicist, former professor at the Indian Institute of Technology, Bombay, Mumbai, India. He is the inventor of the patented Pure Grown Diamond process that cultivates incredible diamonds in a Microwave Plasma Chemical Vapor Deposition chamber from a small carbon seed. It takes from one-and-a-half to two-and-a-half-months to grow a diamond. Source: https://www.prnewswire.com/news-releases/worlds-largest-pure-grown-diamond-unveiled-300005988.html (last visited March 9, 2020).

’078 Claims	Pure Grown Diamonds / IIa Technologies Process
	(12) **United States Patent** (10) **Patent No.: US 8,992,877 B2** **Misra** (45) **Date of Patent: Mar. 31, 2015** (54) **METHOD FOR GROWING MONOCRYSTALLINE DIAMONDS** (75) Inventor: **Devi Shanker Misra**, Mumbai (IN) (73) Assignees: **IIA Technologies Pte. Ltd.**, Singapore (SG); **Indian Institute of Technology Bombay**, Mumbai (IN) (52) **U.S. Cl.** CPC .... ***C30B 29/04*** (2013.01); ***C30B 25/18*** (2013.01) USPC .... **423/446**; 117/84; 117/929 (58) **Field of Classification Search** CPC .... C30B 29/04; C30B 25/18; C30B 25/00; C30B 25/16; C30B 25/165 See application file for complete search history. Source: U.S. Pat. No. 8,992,877 to Misra, at cover page. See also, Decision In the High Court of the Republic of Singapore, [2020] SGHC 26, Suit No 26 of 2016, between Element Six Technologies, Ltd. and IIa Technologies. Carnegie Institution of Washington and M7D Corporation (“Plaintiffs”) also incorporate by reference the evidence and allegations set forth in the Complaint in this action. To the extent the preamble is a limitation, each of the Defendants literally practices this claim language.
1[a] controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.; and	Upon information and belief, each of Pure Grown Diamonds and IIa Technologies collectively or individually controls the temperature gradient of a growth surface of all, or at least some, of its lab grown diamonds during the growth process such that the temperature gradients across the growth surface of at least one stone in a given growth batch is less than 20 degrees C either literally or under the doctrine of equivalents. Defendants’ stones are of a quality and structure which evidence relatively uniform temperature control on their respective growth surfaces during manufacture, such that the temperature gradient on the growth surface of each respective diamond is maintained at less than 20 degrees C. Plaintiffs understand that a plasma cloud is used in the deposition chamber in Defendants’ growth process over multiple diamond seeds/growth surfaces of diamond products. It is understood that this plasma cloud has certain regions adjacent to the growth surfaces of at least some of the diamonds being grown which have a constant or stable temperature across an area such that a relatively uniform temperature gradient profile will be imparted onto a growth surface of at least some of the diamonds being grown in Defendants’ commercial process. Defendants’ use of a plasma cloud having such a uniform temperature region in its commercial growth process provides a uniform temperature gradient as set forth in the claim language.

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	Plaintiffs also incorporate by reference the evidence and allegations set forth in the Complaint in this action. Upon information and belief, based on the foregoing Defendants literally practice this claim element. To the extent Defendants argue they do not literally practice this claim element because of some yet unidentified difference between the process used and the claim language, the process used by Defendants would infringe under the doctrine of equivalents. To the extent the process used by Defendants does not literally practice this claim language, one of ordinary skill in the art would recognize that the temperature gradient used on the growth surfaces of the respective diamonds being grown functions in the same way as the claim limitation to provide the same result such that any difference between Defendants’ method and the claim language is insubstantial.
1[b] growing single-crystal diamond by microwave plasma chemical vapor deposition on the growth surface	Each of Pure Grown Diamonds and IIa Technologies individually or collectively uses a microwave plasma chemical vapor deposition process on the growth surface of the diamonds being grown, and as such each Defendant literally infringes this claim language. The diamonds grown by the Defendants are single crystal diamonds. See generally: MPCVD Technology utilises microwave capabilities to create plasma and facilitate carbon deposition. The technology works at lower pressures exposing multiple diamond seeds to a carbon-rich environment. At the optimised conditions, carbon starts depositing, the seed starts accepting the available carbon, and the natural process of crystallization starts. Source: http://2atechnologies.com/technology-value-chain/, captured April 18, 2019, available at https://web.archive.org/web/20190418033303/http://2atechnologies.com/technology-value-chain/ (last visited March 9, 2020).

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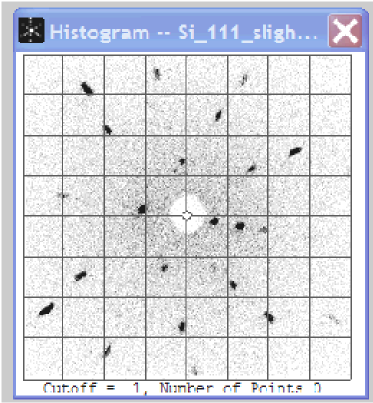
	CRYSTAL ORIENTATION  We use Real-Time X-Ray Reflection Spectroscopy to quickly orient single crystals. We utilise the real-time detector, motorised orientation stages, and computer analysis of back-reflection images to quickly characterise or determine the orientation of the lattice planes in our diamonds. The software automatically collects images, finds Laue spots, and indexes most back-reflection Laue images in real time. Source: http://2atechnologies.com/technology-value-chain/, captured April 18, 2019, available at https://web.archive.org/web/20190418033303/http://2atechnologies.com/technology-value-chain/ (last visited March 9, 2020). Misra is a world-renowned physicist, former professor at the Indian Institute of Technology, Bombay, Mumbai, India. He is the inventor of the patented Pure Grown Diamond process that cultivates incredible diamonds in a Microwave Plasma Chemical Vapor Deposition chamber from a small carbon seed. It takes from one-and-a-half to two-and-a-half-months to grow a diamond. Source: https://www.prnewswire.com/news-releases/worlds-largest-pure-grown-diamond-unveiled-300005988.html (last visited March 9, 2020). A diamond seed is placed inside a low-pressure microwave chamber. Hydrogen and methane gases are introduced. A microwave generator pumps energy into the chamber that ignites a glowing plasma ball. Carbon molecules rain on the seed. Crystallization begins. The process is completed within 42 to 70 days.

’078 Claims	Pure Grown Diamonds / IIa Technologies Process
	Source: https://www.prnewswire.com/news-releases/worlds-largest-pure-grown-diamond-unveiled-300005988.html (last visited March 9, 2020). “A method of forming mono-crystalline diamond by chemical vapor deposition…” Source: U.S. Pat. No. 8,992,877 to Misra, at Abstract. “It is an object of the present invention to provide a CVD process for growing mono-crystalline diamonds substantially free of defects.” Source: U.S. Pat. No. 8,992,877 to Misra, at 2:24-26. “1. A method of forming mono-crystalline gem grade diamond by chemical vapour deposition, the method comprising the steps of: (a) providing at least one diamond seed; (b) exposing the seed to conditions for growing diamond by chemical vapour deposition, including supplying reaction gases that include a carbon-containing gas for growing diamond and include a nitrogen-containing gas; and (c) controlling the quantity of nitrogen-containing gas relative to other gases in the reaction gases such that diamond is caused to grow by step-growth without defects and graphitic inclusions, wherein the quantity of nitrogen-containing gas in the reaction gases is in the range of from 0.0002 to 0.002 vol % and further including diborane in the range of from 0.00002 to 0.002 vol % in the reaction gases.” Source: U.S. Pat. No. 8,992,877 to Misra, at 8:35-51. See also, Decision In the High Court of the Republic of Singapore, [2020] SGHC 26, Suit No 26 of 2016, between Element Six Technologies, Ltd. and IIa Technologies. Plaintiffs also incorporate by reference the evidence and allegations set forth in the Complaint in this action. In view of the foregoing, Defendants literally practice this claim element.
1[c] at a growth temperature in a deposition chamber having an atmosphere with a pressure of at least 130 torr.	Upon information and belief, each of Pure Grown Diamonds and IIa Technologies individually or collectively grows their lab grown diamonds at a growth temperature in a deposition chamber which has an atmosphere with a pressure of at least 130 torr either literally or under the doctrine of equivalents. See generally:

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’078 Claims	Pure Grown Diamonds / IIa Technologies Process
	A diamond seed is placed inside a low-pressure microwave chamber. Hydrogen and methane gases are introduced. A microwave generator pumps energy into the chamber that ignites a glowing plasma ball. Carbon molecules rain on the seed. Crystallization begins. The process is completed within 42 to 70 days. Source: https://www.prnewswire.com/news-releases/worlds-largest-pure-grown-diamond-unveiled-300005988.html (last visited March 9, 2020). Defendants’ stones are of a quality and structure which evidence growth in a deposition chamber at a growth temperature. Additionally, Defendants’ stones are of a quality and structure which evidence growth in a deposition chamber at a pressure of at least 130 torr. Therefore, on information and belief Defendants’ process literally practices this claim language. Plaintiffs also incorporate by reference the evidence and allegations set forth in the Complaint in this action. Upon information and belief, Defendants literally practice this claim element. To the extent Defendants argue they do not literally practice this claim element because of some yet unidentified difference between the process used and the claim language, the process used by Defendants would infringe under the doctrine of equivalents. To the extent the process used by Defendants does not literally practice this claim language, one of ordinary skill in the art would recognize that the pressure used in the growth chambers during the growth process functions in the same way as the claim limitation to provide the same result such that any difference between Defendants’ method and the claim language is insubstantial.
6. The method of claim 1, wherein the pressure is 130-400 torr.	Upon information and belief, each of Pure Grown Diamonds and IIa Technologies individually or collectively grows their lab grown diamonds in a deposition chamber which has an atmosphere with a pressure in the range of 130 to 400 torr either literally or under the doctrine of equivalents. See generally: A diamond seed is placed inside a low-pressure microwave chamber. Hydrogen and methane gases are introduced. A microwave generator pumps energy into the chamber that ignites a glowing plasma ball. Carbon molecules rain on the seed. Crystallization begins. The process is completed within 42 to 70 days. Source: https://www.prnewswire.com/news-releases/worlds-largest-pure-grown-diamond-unveiled-300005988.html (last visited March 9, 2020). Defendants’ stones are of a quality and structure that evidence growth in a deposition chamber at a pressure in the

'078 Claims	Pure Grown Diamonds / IIa Technologies Process
	range of 130 torr to 400 torr. Therefore, on information and belief Defendants' process literally practices this claim language. Plaintiffs also incorporate by reference the evidence and allegations set forth in the Complaint in this action. Upon information and belief, Defendants literally practice this claim element. To the extent Defendants argue they do not literally practice this claim element because of some yet unidentified difference between the process used and the claim language, the process used by Defendants would infringe under the doctrine of equivalents. To the extent the process used by Defendants does not literally practice this claim language, one of ordinary skill in the art would recognize that the pressure used in the growth chambers during the growth process functions in the same way as the claim limitation to provide the same result such that any difference between Defendants' method and the claim language is insubstantial.
7. The method of claim 1, wherein the growth temperature is 1000-1400° C.	Upon information and belief, each of Pure Grown Diamonds and IIa Technologies individually or collectively grows their lab grown diamonds at a growth temperature in a range of 1000 to 1400 degrees C either literally or under the doctrine of equivalents. See generally: "Preferably, chemical vapour deposition conditions comprise maintaining the seed at a temperature in the range of 750 to 1200° C." Source: U.S. Pat. No. 8,992,877 to Misra, at 3:42-44. Defendants' stones are of a quality and structure which evidence growth in a deposition chamber at a growth temperature in a range of 1000 to 1400 degrees C. Therefore, on information and belief Defendants' process literally practices this claim language. Plaintiffs also incorporate by reference the evidence and allegations set forth in the Complaint in this action. Upon information and belief, Defendants literally practice this claim element. To the extent Defendants argue they do not literally practice this claim element because of some yet unidentified difference between the process used and the claim language, the process used by Defendants would infringe under the doctrine of equivalents. To the extent the process used by Defendants does not literally practice this claim language, one of ordinary skill in the art would recognize that the temperature used in the growth chambers during the growth process functions in the same way as the claim limitation to provide the same result such that any difference between Defendants method and the claim language is insubstantial.
11. The method of claim 1, wherein a growth rate of the single-crystal diamond is 1 to 150 micrometer per	Upon information and belief, each of Pure Grown Diamonds and IIa Technologies individually or collectively grows their lab grown diamonds at a growth rate in the range of 1 to 150 micrometers per hour either literally or under the doctrine of

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'078 Claims	Pure Grown Diamonds / IIa Technologies Process
hour.	equivalents. See generally: "Diamond is grown on a substrate comprising a diamond seed that may vary in size between 3x3 mm and 5x5 mm." Source: U.S. Pat. No. 8,992,877 to Misra, at 5:16-17. A diamond seed is placed inside a low-pressure microwave chamber. Hydrogen and methane gases are introduced. A microwave generator pumps energy into the chamber that ignites a glowing plasma ball. Carbon molecules rain on the seed. Crystallization begins. The process is completed within 42 to 70 days. Source: https://www.prnewswire.com/news-releases/worlds-largest-pure-grown-diamond-unveiled-300005988.html (last visited March 9, 2020). Misra is a world-renowned physicist, former professor at the Indian Institute of Technology, Bombay, Mumbai, India. He is the inventor of the patented Pure Grown Diamond process that cultivates incredible diamonds in a Microwave Plasma Chemical Vapor Deposition chamber from a small carbon seed. It takes from one-and-a-half to two-and-a-half-months to grow a diamond. Source: https://www.prnewswire.com/news-releases/worlds-largest-pure-grown-diamond-unveiled-300005988.html (last visited March 9, 2020). "19. A method of growing gem grade diamond where the diamond grows with the optimal range of nitrogen flow with a growth rate of 18-20 microns per hour." Source: U.S. Patent Application Publication No. 2013/0239615 to Misra, at claim 19. Because Defendants are manufacturing gem quality diamonds, which are cut to gem stones of generally known size and size ratios (for example, see generally dimensions for the American ideal cut diamond http://www.thediamondchoice.com/tech.htm) and the information set forth above, upon information and belief, Defendants' process has a growth rate in the range of 1 to 150 microns per hour. For example, based on the information provide above, Defendants' diamonds of an approximate ½ carat size are manufactured with a growth rate between 2 and 5 microns per hour. Upon information and belief, Defendants literally practice this claim element. To the extent Defendants argue they do

’078 Claims	Pure Grown Diamonds / IIa Technologies Process
	not literally practice this claim element because of some yet unidentified difference between the process used and the claim language, the process used by Defendants would infringe under the doctrine of equivalents. To the extent the process used by Defendants does not literally practice this claim language, one of ordinary skill in the art would recognize that the growth rates used in the growth chambers during the growth process functions in the same way as the claim limitation to provide the same result such that any difference between Defendants method and the claim language is insubstantial.
12[pre] A method for diamond production, comprising:	See claim 1[pre].
12[a] controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.; and	See claim 1[a].
12[b] growing single-crystal diamond by microwave plasma chemical vapor deposition on the growth surface	See claim 1[b].
12[c] at a temperature of 900-1400° C.	See claim 7.
15. The method of claim 12, wherein the atmosphere further includes 1-3% oxygen per unit of hydrogen.	Upon information and belief, each of Pure Grown Diamonds and IIa Technologies individually or collectively grows their lab grown diamonds in an atmosphere that inlcudes 1 to 3% oxygen per unit of hydrogen either literally or under the doctrine of equivalents. See generally: Misra is a world-renowned physicist, former professor at the Indian Institute of Technology, Bombay, Mumbai, India. He is the inventor of the patented Pure Grown Diamond process that cultivates incredible diamonds in a Microwave Plasma Chemical Vapor Deposition chamber from a small carbon seed. It takes from one-and-a-half to two-and-a-half-months to grow a diamond. Source: https://www.prnewswire.com/news-releases/worlds-largest-pure-grown-diamond-unveiled-300005988.html (last visited March 9, 2020). “[0039] Preferably, the reaction gases are in the following relative quantities: The methane 20-80 sccm (standard cubic

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	centimetres per minute), hydrogen 300-800 sccm, nitrogen 0.0005-1 sccm, diborane 0.0001-0.5 sccm, oxygen 1-10 sccm. The invention also provides a mono-crystalline diamond of gem quality formed in accordance with the method of the invention.” Source: U.S. Patent Application Publication No. 2013/0239615 to Misra, at [0039]. Plaintiffs also incorporate by reference the evidence and allegations set forth in the Complaint in this action. Upon information and belief, Defendants literally practice this claim element. To the extent Defendants argue they do not literally practice this claim element because of some yet unidentified difference between the process used and the claim language, the process used by Defendants would infringe under the doctrine of equivalents. To the extent the process used by Defendants does not literally practice this claim language, one of ordinary skill in the art would recognize that the oxygen content in the growth chambers during the growth process functions in the same way as the claim limitation to provide the same result such that any difference between Defendants method and the claim language is insubstantial.
16. The method of claim 12, wherein a pressure of an atmosphere in which diamond growth occurs is 130-400 torr.	See claim 6.
20. The method of claim 12, wherein a growth rate of the single-crystal diamond is 1 to 150 micrometer per hour.	See claim 11.

EXHIBIT B

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INFRINGEMENT CONTENTION CLAIM CHART
U.S. Pat. No. RE41,189 to Li et al. ("'189") - Method Of Making Enhanced CVD Diamond

'189 Claims	Pure Grown Diamonds / IIa Technologies Process
1[pre] A method to improve the optical clarity of CVD diamond	Each of Pure Grown Diamonds and IIa Technologies individually or collectively uses a method to improve the optical clarity of diamonds manufactured by a CVD process. See generally: For example, see the Decision In the High Court of the Republic of Singapore, [2020] SGHC 26, Suit No 26 of 2016, between Element Six Technologies, Ltd. and IIa Technologies. In this Decision the Court found that Defendant IIa Technologies uses a process of "annealing" CVD made diamonds. (See paragraph 475.) Additionally, Defendants' products are of a quality and structure which evidence that their optical quality has been improved.
1[a] where the CVD diamond is single crystal CVD diamond,	Each of Pure Grown Diamonds and IIa Technologies produces CVD diamonds with single crystal structure. See generally: MPCVD Technology utilises microwave capabilities to create plasma and facilitate carbon deposition. The technology works at lower pressures exposing multiple diamond seeds to a carbon-rich environment. At the optimised conditions, carbon starts depositing, the seed starts accepting the available carbon, and the natural process of crystallization starts. Source: http://2atechnologies.com/technology-value-chain/, captured April 18, 2019, available at https://web.archive.org/web/20190418033303/http://2atechnologies.com/technology-value-chain/ (last visited March 9, 2020).

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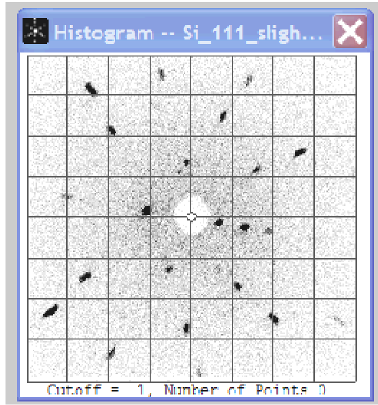
CRYSTAL ORIENTATION



We use Real-Time X-Ray Reflection Spectroscopy to quickly orient single crystals. We utilise the real-time detector, motorised orientation stages, and computer analysis of back-reflection images to quickly characterise or determine the orientation of the lattice planes in our diamonds.

The software automatically collects images, finds Laue spots, and indexes most back-reflection Laue images in real time.

Source: http://2atechnologies.com/technology-value-chain/, captured April 18, 2019, available at https://web.archive.org/web/20190418033303/http://2atechnologies.com/technology-value-chain/ (last visited March 9, 2020).

Misra is a world-renowned physicist, former professor at the Indian Institute of Technology, Bombay, Mumbai, India. He is the inventor of the patented Pure Grown Diamond process that cultivates incredible diamonds in a Microwave Plasma Chemical Vapor Deposition chamber from a small carbon seed. It takes from one-and-a-half to two-and-a-half-months to grow a diamond.

Source: https://www.prnewswire.com/news-releases/worlds-largest-pure-grown-diamond-unveiled-300005988.html (last visited March 9, 2020).

A diamond seed is placed inside a low-pressure microwave chamber. Hydrogen and methane gases are introduced. A microwave generator pumps energy into the chamber that ignites a glowing plasma ball. Carbon molecules rain on the seed. Crystallization begins. The process is completed within 42 to 70 days.

Source: https://www.prnewswire.com/news-releases/worlds-largest-pure-grown-diamond-unveiled-300005988.html

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Carnegie Institution of Washington et al. v. Pure Grown Diamonds, Inc. et al.

’189 Claims	Pure Grown Diamonds / IIa Technologies Process
	(last visited March 9, 2020). “A method of forming mono-crystalline diamond by chemical vapor deposition…” Source: U.S. Pat. No. 8,992,877 to Misra, at Abstract. “It is an object of the present invention to provide a CVD process for growing mono-crystalline diamonds substantially free of defects.” Source: U.S. Pat. No. 8,992,877 to Misra, at 2:24-26. “1. A method of forming mono-crystalline gem grade diamond by chemical vapour deposition, the method comprising the steps of: (a) providing at least one diamond seed; (b) exposing the seed to conditions for growing diamond by chemical vapour deposition, including supplying reaction gases that include a carbon-containing gas for growing diamond and include a nitrogen-containing gas; and (c) controlling the quantity of nitrogen-containing gas relative to other gases in the reaction gases such that diamond is caused to grow by step-growth without defects and graphitic inclusions, wherein the quantity of nitrogen-containing gas in the reaction gases is in the range of from 0.0002 to 0.002 vol % and further including diborane in the range of from 0.00002 to 0.002 vol % in the reaction gases.” Source: U.S. Pat. No. 8,992,877 to Misra, at 8:35-51. See also, Decision In the High Court of the Republic of Singapore, [2020] SGHC 26, Suit No 26 of 2016, between Element Six Technologies, Ltd. and IIa Technologies. Therefore, Defendants’ diamonds are single crystal diamonds and Defendants literally practice this claim limitation.
1[b] by raising the CVD diamond to a set temperature of at least 1500° C. and a pressure of at least 4.0 GPA outside of the diamond stable phase.	Upon information and belief, each of Pure Grown Diamonds and IIa Technologies either individually or collectively utilizes an annealing process which raises the diamond to a set temperature of at least 1500 degrees centigrade and a pressure of at least 4.0 GPA outside of the diamond stable phase either literally or under the doctrine of equivalents. Specifically, based on Plaintiffs’ understanding of Defendants’ manufacturing process of its lab grown diamonds, such diamonds can be produced with a color that is not desirable for gem quality stones and therefore require post processing through annealing to improve the optical quality of the diamond for gem uses. Based on information and belief, Defendants utilize a post processing procedure at a temperature at or above the claimed limit and a pressure at or above the claimed limit, either literally or under the doctrine of equivalents, to improve the color quality of their stones for use in gem applications.

Case 1:20-cv-00189-JSR
Carnegie Institution of Washington et al. v. Pure Grown Diamonds, Inc. et al.

’189 Claims	Pure Grown Diamonds / IIa Technologies Process
	Plaintiffs also incorporate by reference the evidence and allegations set forth in the Complaint in this action. Upon information and belief, Defendants literally practice this claim element. To the extent Defendants argue they do not literally practice this claim element because of some yet unidentified difference between the process used and the claim language, the process used by Defendants would infringe under the doctrine of equivalents. To the extent the process used by Defendants does not literally practice this claim language, one of ordinary skill in the art would recognize that the temperature and/or pressure used in the annealing process function in the same way as the claim limitation to provide the same result such that any difference between Defendants’ method and the claim language is insubstantial.
2. The method of claim 1 wherein the CVD diamond is a single crystal coating upon another material.	On information and belief, diamonds grown by Pure Grown Diamonds and IIa Technologies, either individually or collectively, are grown upon seed diamond crystals (see claim 1[a]). Accordingly, the diamond crystal grown on the seed constitutes a single crystal coating upon another material (i.e., upon the seed). In view of the foregoing Defendants literally infringe this claim.

CERTIFICATE OF SERVICE

I hereby certify that on March 11, 2020, I caused to be served copies of the foregoing PLAINTIFFS' LOCAL PATENT RULE 6 DISCLOSURE TO DEFENDANTS PURE GROWN DIAMONDS, INC. AND IIA TECHNOLOGIES PTE. LTD. on the following counsel via email:

Anand K. Sharma
J. Preston Long
Finnegan, Henderson, Farabow, Garrett & Dunner, LLP
901 New York Avenue, NW
Washington, DC 20001
anand.sharma@finnegan.com
j.preston.long@finnegan.com

William P. Deni
J. Brugh Lower
Gibbons P.C.
One Pennsylvania Plaza, 37th Floor
New York, NY 10119-3701
wdeni@gibbonslaw.com
jlower@gibbonslaw.com

Counsel for Defendants Pure Grown Diamonds, Inc. and IIa Technologies Pte. Ltd.

Dated: March 11, 2020

By:______________________________
Terrence J. Wikberg (*admitted pro hac vice)*
PERKINS COIE LLP

Counsel for Plaintiffs
Carnegie Institution of Washington and M7D Corporation

EXHIBIT E

JOURNAL OF CRYSTAL GROWTH

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LETTER TO THE EDITORS

DIAMOND SYNTHESIS FROM GAS PHASE IN MICROWAVE PLASMA

Mutsukazu KAMO, Yoichiro SATO, Seiichiro MATSUMOTO and Nobuo SETAKA

National Institute for Research in Inorganic Materials, 1-1 Namiki, Sakura-mura, Niihari-gun, Ibaraki 305, Japan

Received 12 April 1983

Crystalline diamond predominantly composed of {100} and {111} faces was grown on a non-diamond substrate from a gaseous mixture of hydrogen and methane under microwave glow discharge conditions.

Various attempts have been made to synthesize diamond under thermodynamically metastable conditions [1–11]. Since the earlier work in this field, efforts have been made to grow diamond on diamond seed crystals by chemical vapor deposition (CVD) using gaseous carbon compounds such as hydrocarbons or carbon monoxide [1–3]. Although the growth seemed to proceed to an certain extent, co-deposition of graphitic carbons hindered an extensive growth of diamond in spite of the introduction of cleaning processes to remove the graphitic carbon. On the other hand, Spitsyn and his coworkers [4] have reported that diamond crystals can be grown on diamond and non-diamond substrate like copper, gold, silicon or tungsten by chemical transport in a closed system. We [5] have shown that growth on non-diamond substrates such as silicon, molybdenum and silica glass is also feasible in a flow system using a gaseous mixture of hydrogen and hydrocarbons. The growth features of diamond by the last two methods appear to have much in common. One of the most interesting features is that the crystals have well-defined habits and often appear as octahedral, cubo-octahedral or multiply twinned particles truncated by the substrates.

An increasing number of papers [6–11] have been reported on the formation of mechanically hard, electrically insulating and optically transparent films, which are often termed as diamond-like carbon films. The films are made by low-energy ion-beam techniques, plasma assisted vapor deposition and combined techniques using ion beams. Structural studies of the films have shown that most of the films have an amorphous nature. Diffraction patterns which may be reasonbly assigned to the diamond structure have been observed in parts of the films by Spencer et al. [7] for the ion-deposited films, by Sokolowski et al. [8] for plasma-deposited films and by Weissmantel et al. [10] for annealed i-carbon films. Mania et al. [11] reported that plate or needle-shaped diamond crystals have been obtained by plasma vapor deposition.

This paper reports a preliminary result of our study that crystalline diamond can be grown on a non-diamond substrate using a gaseous mixture of hydrogen and methane under microwave glow discharge conditions.

A schematic drawing of the deposition apparatus is shown in fig. 1. A silica glass tube 40 mm in

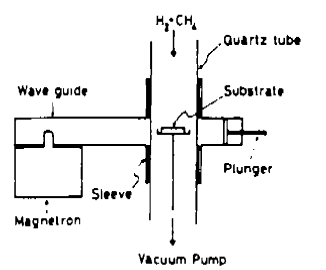

Fig. 1. Schematic drawing of the deposition system.

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diameter that passes through the sleeves attached to the guide tube served as the deposition chamber. Microwave (2.45 GHz) generated by the magnetron is transmitted to the chamber through a set of wave guides, a power monitor and a tuner. The position of the plasma was adjusted to the center of the deposition chamber, where the substrate was held by an alumina basket. Deposition was performed by passing a mixture of hydrogen and methane to the chamber and then applying microwave power to induce glow discharge. Diamond particles were formed on the silicon wafers under the following conditions: methane content, 1%–3%; total pressure, 1–8 KPa; microwave power, 300–700 W. The temperature of the substrate was tentatively measured by an optical pyrometer. It ranged from 800 to 1000°C depending of the microwave power and the gas pressure. Under the conditions given above, light emission from the plasma had a negligible effect on the pyrometric measurement.

Scanning electron micrographs of the sample obtained by a deposition run of 3 h are shown in fig. 2. It is seen that the crystals show well-defined habits and have about the same size. The faces that predominantly appeared were (111) or (100) faces. Cubo-octahedral, twinned and octahedral crystals, all truncated by the substrate, have been observed. When the microwave power was kept constant, diamond crystals tended to have hemispherical shapes as the content of methane was increased. When the methane concentration was constant, polyhedrons were formed at lower microwave powers and irregular shaped crystals were formed at higher powers. The maximum growth rate was about 3 $\mu m/h$. For the identification of the deposits, the samples were studied by reflection high energy electron diffraction (RHEED) and Raman spectroscopy. The diffraction was observed by an electron microscope equipped with an RHEED attachment under grazing angle incidence. The diffraction pattern consisted of spotty rings as shown in fig. 3. The interlayer spacings were determined with reference to the diffraction of an evaporated gold film. The obtained values are in good agreement with the values reported for diamond as given in table 1.

The Raman scattering was observed by a Spex Ramalog 1401 spectrometer. The 488.0 or 514.5 nm lines were used for excitation. The spectra were recorded with a back-scattering geometry. The spectrum of an as-deposited specimen is shown in fig. 4. At the Raman shift range of 200–3000 cm^{-1}, four Raman lines of comparable intensity were observed, of which two are due to the substrate (Si) and a sharp peak at 1333 ± 1.5 cm^{-1} agrees with the reported value of 1332.5 cm^{-1} for the Raman line of diamond [12]. The origin of the broad peak centered at about 1500 cm^{-1} is not known, but it is noted that a similar peak is observed with some of the specimens obtained by the vapor deposition [13]. The peak may be due to

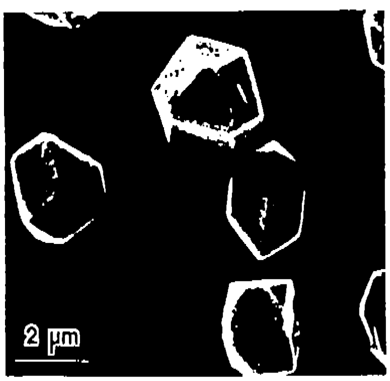

Fig. 2. Scanning electron micrograph of diamond particles grown from gas phase in microwave plasma.

Fig. 3. Reflection electron diffraction pattern of diamond particles grown on Si.

Table 1
Comparison of observed interlayer spacings with the values of diamond (ASTM 6-675)

Observed		Diamond		
d (Å)	I	d (Å)	I/I₁	hkl
2.07	s	2.06	100	111
1.27	s	1.261	25	220
1.08	s	1.0754	16	311
1.04	w	–	–	222
0.89	w	0.8916	8	400
0.81	m	0.8182	16	331
0.725	m	0.7280 [a]		422
0.685	w	0.6864 [a]		511, 333
0.632	w	0.6305 [a]		440
0.603	w	0.6029 [a]		531

[a] Ref. [5].

a structural defect but no assignment has been made.

The main features of growth are similar to those observed with the chemical vapor deposition reported previously [5]. The crystals do not only grow on silicon but also on molybdenum and other refractory metals and on oxides like silica and alumina.

In contrast to most of the previous work employing plasma techniques, it has been shown that diamond crystals with well-defined structure and morphology can also be grown by plasma assisted vapor deposition.

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EXHIBIT F

McGraw-Hill Dictionary of Scientific and Technical Terms

Fifth Edition

McGRAW-HILL® DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS

Fifth Edition

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On the cover: Photomicrograph of crystals of vitamin B_1.
(Dennis Kunkel, University of Hawaii)

In addition, material has been drawn from the following references: R. E. Huschke, *Glossary of Meteorology*, American Meteorological Society, 1959; *U.S. Air Force Glossary of Standardized Terms*, AF Manual 11-1, vol. 1, 1972; *Communications-Electronics Terminology*, AF Manual 11-1, vol. 3, 1970; W. H. Allen, ed., *Dictionary of Technical Terms for Aerospace Use*, 1st ed., National Aeronautics and Space Administration, 1965; J. M. Gilliland, *Solar-Terrestrial Physics: A Glossary of Terms and Abbreviations*, Royal Aircraft Establishment Technical Report 67158, 1967; *Glossary of Air Traffic Control Terms*, Federal Aviation Agency; *A Glossary of Range Terminology, White Sands Missile Range, New Mexico*, National Bureau of Standards, AD 467-424; *A DOD Glossary of Mapping, Charting and Geodetic Terms*, 1st ed., Department of Defense, 1967; P. W. Thrush, comp. and ed., *A Dictionary of Mining, Mineral, and Related Terms*, Bureau of Mines, 1968; *Nuclear Terms: A Glossary*, 2d ed., Atomic Energy Commission; F. Casey, ed., *Compilation of Terms in Information Sciences Technology*, Federal Council for Science and Technology, 1970; *Glossary of Stinfo Terminology*, Office of Aerospace Research, U.S. Air Force, 1963; *Naval Dictionary of Electronic, Technical, and Imperative Terms*, Bureau of Naval Personnel, 1962; *ADP Glossary*, Department of the Navy, NAVSO P-3097.

McGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS, Fifth Edition

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INTERNATIONAL EDITION

When ordering this title, use ISBN 0-07-113584-7.

polycrystal [MATER] A polycrystalline solid. { ¦päl·i'krist·əl }

polycrystalline [MATER] **1.** Pertaining to a material composed of aggregates of individual crystals. **2.** Characterized by variously oriented crystals. { ¦päl·i'krist·əl·ən }

Polyctenidae [INV ZOO] A family of hemipteran insects in the superfamily Cimicoidea; the individuals are bat ectoparasites which resemble bedbugs but lack eyes and have ctenidia and strong claws. { ˌpäl·ək'ten·əˌdē }

polycyclic [ORG CHEM] A molecule that contains two or more closed atomic rings; can be aromatic (such as DDT), aliphatic (bianthryl), or mixed (dicarbazyl). { ¦päl·i'sī·klik }

polycyclic hydrocarbon *See* polynuclear hydrocarbon. { ¦päl·i'sī·klik 'hī·drəˌkär·bən }

polycyesis [MED] Multiple pregnancy. { ¦päl·i·sī'ē·səs }

polycystic kidney [MED] A usually hereditary, congenital, and bilateral disease in which a large number of cysts are present on the kidney. { ¦päl·i'sis·tik 'kid·nē }

polycythemia [MED] A condition characterized by an increased number of erythrocytes in the circulation. { ˌpäl·iˌsī'thē·mē·ə }

polycythemia vera [MED] An absolute increase in all blood cells derived from bone marrow, especially erythrocytes. { ˌpäl·iˌsī'thē·mē·ə 'vir·ə }

polydactyly [MED] The condition of having supernumerary fingers or toes. { ˌpäl·i'dak·təl·ē }

polydent [ORG CHEM] Pertaining to a chemical species whose molecules possess more than two reactive sites. Also known as multident. { 'päl·əˌdent }

polydipsia [MED] Excessive thirst. { ˌpäl·i'dip·sē·ə }

polydisperse colloidal system [CHEM] A colloidal system in which the suspended particles have various sizes and shapes. { ¦päl·i·di'spərs kə¦lȯid·əl 'sis·təm }

polydispersity [CHEM] Molecular-weight nonhomogeneity in a polymer system; that is, there is some molecular-weight distribution throughout the body of the polymer. { ¦päl·i·di'spər·səd·ē }

Polydolopidae [PALEON] A Cenozoic family of rodentlike marsupial mammals. { ˌpäl·i·də'läp·əˌdē }

polydymite [MINERAL] Ni_3S_4 A mineral of the linnaeite group consisting of nickel sulfide. { pə'lid·əˌmīt }

polyelectrolyte [ORG CHEM] A natural or synthetic electrolyte with high molecular weight, such as proteins, polysaccharides, and alkyl addition products of polyvinyl pyridine; can be a weak or strong electrolyte; when dissociated in solution, it does not give uniform distribution of positive and negative ions (the ions of one sign are bound to the polymer chain while the ions of the other sign diffuse through the solution). { ¦päl·ē·ə'lek·trəˌlīt }

polyembryony [ZOO] A form of sexual reproduction in which two or more offspring are derived from a single egg. { ¦päl·ē·im'brī·əˌnē }

polyene [ORG CHEM] Compound containing many double bonds, such as the carotenoids. { 'päl·ēˌēn }

polyester fiber [TEXT] A fiber filament made from a material that is 85% or more thermoplastic polyester resin. { 'päl·ēˌes·tər 'fī·bər }

polyester film [MATER] Thin film made of polyester resin; used for packaging food and other products. { 'päl·ēˌes·tər 'film }

polyester laminate [MATER] Glass fabric or fiber mat impregnated with a polyester resin slurry, and cured; used to make sheets, bars, and structural shapes. { 'päl·ēˌes·tər 'lam·ə·nət }

polyester-reinforced urethane [MATER] A poromeric material which may have a urethane impregnation or a silicone coating; used for shoe uppers and as a substitute for industrial leathers. { 'päl·ēˌes·tər ˌrē·inˌfȯrst 'yu̇r·əˌthān }

polyester resin [ORG CHEM] A thermosetting or thermoplastic synthetic resin made by esterification of polybasic organic acids with polyhydric acids; examples are Dacron and Mylar; the resin has high strength and excellent resistance to moisture and chemicals when cured. { 'päl·ēˌes·tər 'rez·ən }

polyester rubber *See* polyurethane rubber. { 'päl·ēˌes·tər 'rəb·ər }

polyestrous [PHYSIO] Having several periods of estrus in a year. { ¦päl·ē'es·trəs }

polyether [ORG CHEM] Any compound whose molecular structure contains linked ethers, R—O—R′, where R and R′ represent functional groups. { 'päl·ēˌē·thər }

polyether resin [ORG CHEM] Any member of a large group of thermoplastic or thermosetting polymers that conta... ical polyether linkages in the polymer chain. { ... 'rez·ən }

polyethylene *See* ethylene resin. { ¦päl·ē'eth·əˌlēn }

polyethylene glycol [ORG CHEM] Any of a family... less, water-soluble liquids with molecular weights from... 6000; soluble also in aromatic hydrocarbons (not aliph... many organic solvents; used to make emulsifying ag... detergents, and as plasticizers, humectants, and water... textile lubricants. { ¦päl·ē'eth·əˌlēn 'glīˌkȯl }

polyethylene glycol distearate *See* polyglycol d... { ¦päl·ē'eth·əˌlēn 'glīˌkȯl dī'stirˌāt }

polyethylene resin *See* ethylene resin. { ¦päl·ē'eth·əˌlēn ... ən }

polyethylene terephthalate [ORG CHEM] A thermo... polyester resin made from ethylene glycol and tereph... melts at 265°C; used to make films or fibers. Abbreviated... { ¦päl·ē'eth·əˌlēn ˌter·ə'thaˌlāt }

polyforming [CHEM ENG] A noncatalytic, petroleum... process charging C_3 and C_4 gases with naphtha or gas oil... temperature to produce high-quality gasoline and f... mostly replaced by catalytic reforming; the product is kn... polyformdistillate. { 'päl·ēˌfȯrm·iŋ }

Polygalaceae [BOT] A family of dicotyledonous plants in... order Polygalales distinguished by having a bicarpellate... and monadelphous stamens. { ˌpäl·i·gə'lās·ēˌē }

polygalacturonase [BIOCHEM] An enzyme that catalyzes... hydrolysis of glycosidic linkage of polymerized galactu... acids. { ˌpäl·iˌgaˌlak'tu̇r·əˌnās }

Polygalales [BOT] An order of dicotyledonous plants... subclass Rosidae characterized by its simple leaves and u... irregular, hypogynous flowers. { ˌpäl·i·gə'lā·lēz }

polygamous [BOT] Having both perfect and imperfect flow... ers on the same plant. [VERT ZOO] Having more than... mate at one time. { pə'lig·ə·məs }

polygen *See* polyvalent. { 'päl·i·jən }

polygene [GEN] One of a group of nonallelic genes that co... lectively control a quantitative character. [GEOL] An ig... rock composed of two or more minerals. Also known as po... lymere. { 'päl·iˌjēn }

polygenetic [GEOL] **1.** Resulting from more than one pro... of formation or derived from more than one source, or origin... ing or developing at various places and times. **2.** Consisting... more than one type of material, or having a heterogeneous com... position. Also known as polygenic. { ¦päl·i·jə'ned·ik }

polygenic *See* polygenetic. { ¦päl·i¦jen·ik }

polygeosyncline [GEOL] A geosynclinal-geoanticlinal be... that lies along the continental margin and receives sedim... from a borderland on its oceanic side. { ¦päl·iˌjē·ō'sinˌklīn }

polyglycol [ORG CHEM] A dihydroxy ether derived from the... dehydration (removal of a water molecule) of two or more gly... molecules; an example is diethylene glycol, CH_2OHCH_2O... CH_2CH_2OH. { 'päl·iˌglīˌkȯl }

polyglycol distearate [ORG CHEM] $(C_{17}H_{35})CO$... $(CH_2CH_2O)_x$ An off-white, soft solid with a melting point... 43°C; soluble in chlorinated solvents, acetone, and light ethers... used as a resin plasticizer. Also known as polyethylene glycol distearate. { 'päl·iˌglīˌkȯl dī'stirˌāt }

Polygnathidae [PALEON] A family of Middle Silurian to C... taceous conodonts in the suborder Conodontiformes, having... platforms with small pitlike attachment scars. { ˌpäl'ig'nath·əˌdē }

polygon [MATH] A figure in the plane given by points p_1, p_2, ..., p_n and line segments p_1p_2, p_2p_3, ..., $p_{n-1}p_n$, p_np_1. { 'päl·iˌgän }

Polygonaceae [BOT] The single family of the order Poly... gonales. { pəˌlig·ə'nās·ēˌē }

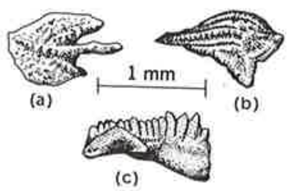
Polygonales [BOT] An order of dicotyledonous plants in the... subclass Caryophyllidae characterized by well-developed en... dosperm, a unilocular ovary, and often trimerous flowers. { pəˌlig·ə'nā·lēz }

polygonal ground [GEOL] A ground surface consisting of... polygonal arrangements of rock, soil, and vegetation formed on... a level or gently sloping surface by frost action. Also known as cellular soil. { pə'lig·ən·əl 'grau̇nd }

polygonal karst [GEOL] A karst pattern that is characteristic... of tropical types such as cone karsts, with the surface completely... divided into a polygonal network. { pə'lig·ən·əl 'kärst }

polygonal method [MIN ENG] A method of estimating ...

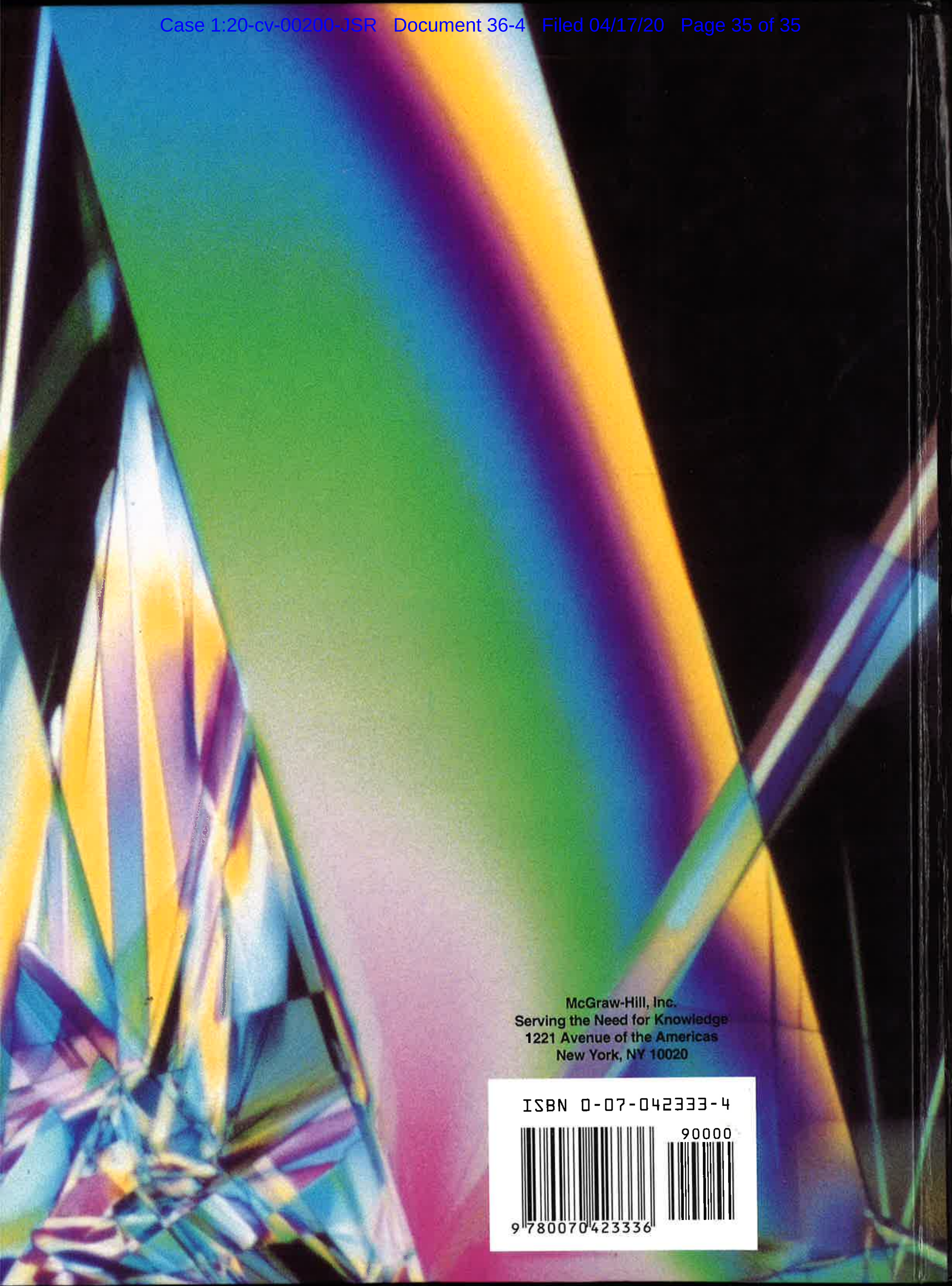
POLYGNATHIDAE



Toothlike shapes of polygnaths show their platformlike appearance. *(a) Ancyrodella. (b) Palmatolepis. (c) Polygnathus.*

POLYGONALES

Polygonum hydropiper, eastern American smartweed. (Photograph by A. W. Ambler, from National Audubon Society)



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